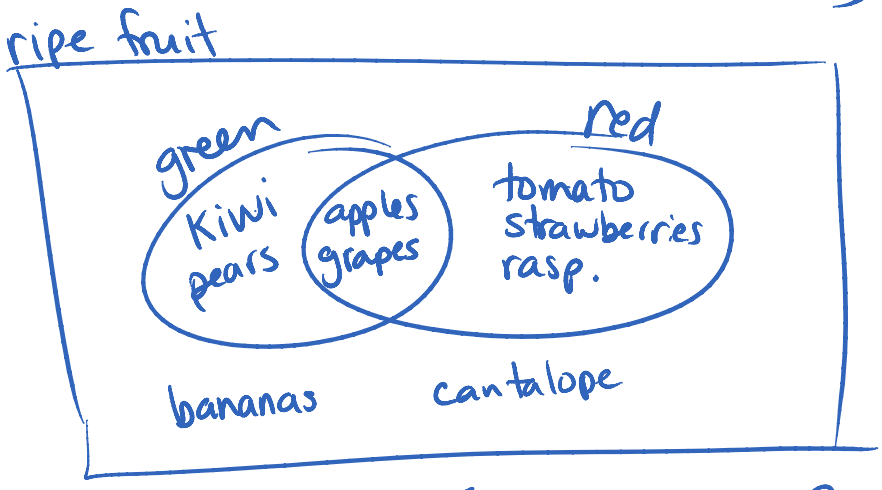
3.3 Intersection and Union

Monday, February 25, 2013
10:30 AM

Intersection – the set of elements that are common to (in both of) 2 or more sets
- the "overlap"
- notation $A \cap B$
  = elements shared by A and B

ex



green $\cap$ red = {apples, grapes}

Union – the set of all the elements of 2 or more sets (being careful not to count anything twice
- notation $A \cup B$
  = the elements of A or B both

ex green $\cup$ red = {Kiwi, pears, apples, grapes, tomato, straw, rasp.}

ex $(\text{green} \cup \text{red})'$ = compliment of (green U red)

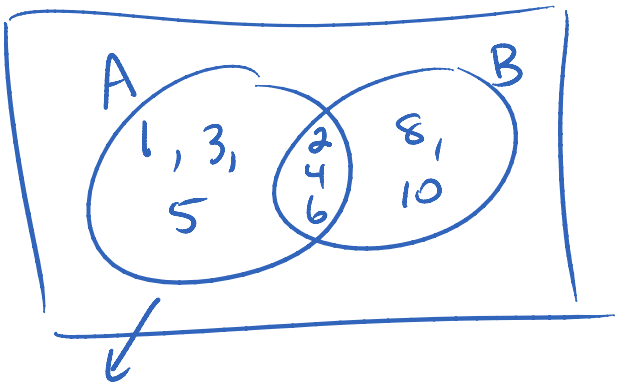
= {bananas, cantalope}

Principle of Inclusion and Exclusion

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$A = \{1, 2, 3, 4, 5, 6\}$

$B = \{2, 4, 6, 8, 10\}$



$$n(A \cup B) = 8 = n(A) + n(B) - n(A \cap B)$$

$$= 6 + 5 - 3$$

$$= 8$$

- Count the intersection twice, but should only count once, so must subtract away.

"Minus"

$A \setminus B \equiv$ A minus B

$\equiv$ elements in A, but not in B

(So, only in A, not the overlap)

ex green fruit \ red fruit
= {kiwi, pears}

(ex green fruit = {kiwi, pears, apples, grapes})

ex $n(B \setminus A) =$ ② elements {8, 10}

ex $n(B \cap A) = 3$

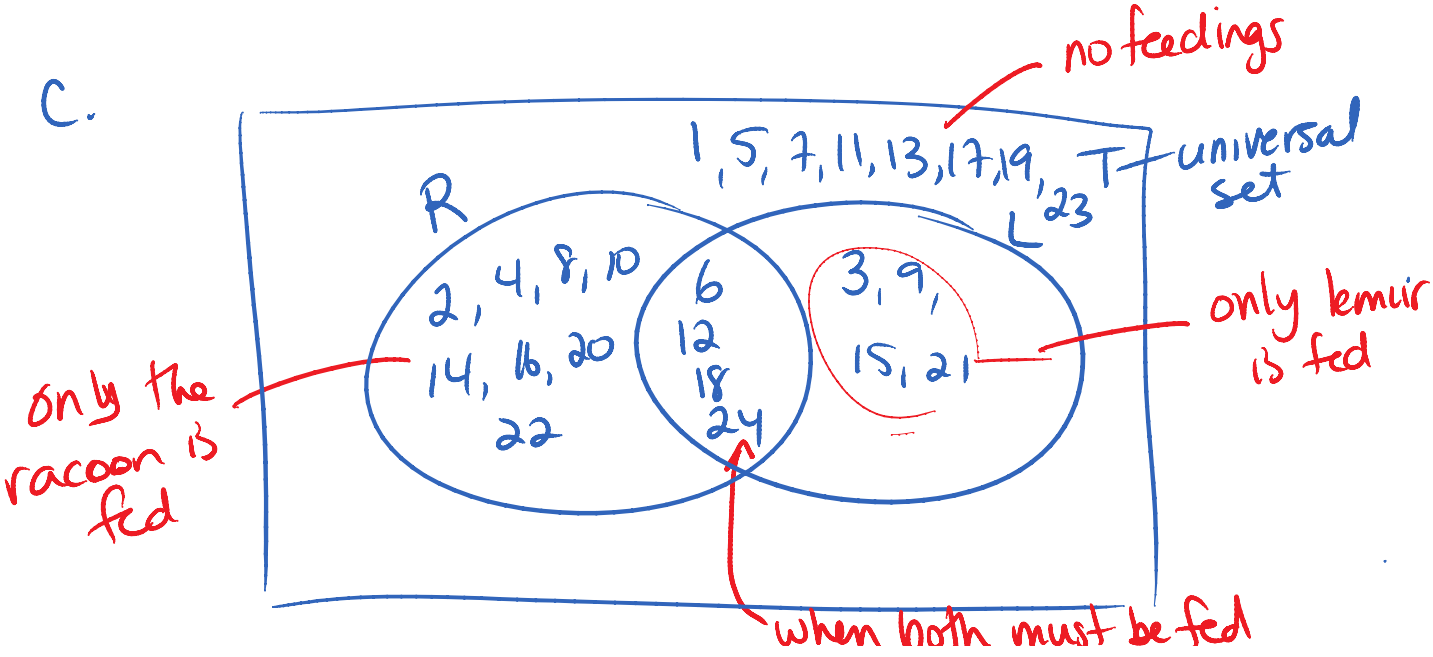
pg 162 Investigate

A. $T = \{1, 2 \ldots 24\}$

$R = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24\}$

$L = \{3, 6, 9, 12, 15, 18, 21, 24\}$

C.



D. $R \cap L = \{6, 12, 18, 24\}$ (needs help)

E. $R \setminus L$ = in R, but not in L

$= \{2, 4, 8, 10, 14, 16, 20, 22\}$

= only feeding raccoon

$L \setminus R = \{3, 9, 15, 21\}$

= only feeding lemur

F. $R \cup L = \{2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24\}$

G. $(R \cup L)'$ = complement of $(R \cup L)$

$= \{1, 5, 7, 11, 13, 17, 19, 23\}$

H. $R \cap L$ = elements in set R and set L

$R \cup L$ = elements in set R or set L

J. $n(R \cup L) = n(R) + n(L)$ → T or F ?

$16 \neq 12 + 8$

$n(R \cup L) = n(R) + n(L) - n(R \cap L)$

K. $n(L \setminus R) = n(L) - n(R \cap L)$

or

$= n(L \cup R) - n(R)$

Practice pg 172 # 1-4, 7, 10, 12, 16